

## REMARKS

Claims 1, 5-26, and 31-34 are pending. Claims 1 and 15 are amended in this response. New claim 35 has been added. Support for the amendment to claim 1 can be found at page 3, lines 11-24, Example 4, and elsewhere in the specification, especially the examples. The definition of "volumetric productivity" has been incorporated into the claim; the scope of the claim is unchanged by this amendment. Volumetric productivity is a characteristic of a catalyst; the claim is now amended to specifically recite conditions for the technique that should be used to determine whether a given catalyst possesses the claimed volumetric productivity. Support for new claim can be found at page 4, lines 24-25.

### Rejections under 35 U.S.C. § 102(e)

Claims 1, 5-7, 9-15, 19-20, 23, 26, and 33-34 have been rejected under 35 U.S.C. § 102(e) as being anticipated by, or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 6,413,449 to Wieland et al. This rejection is respectfully traversed.

In paragraph 8 of the Office Action it is remarked that no process conditions are specified in the claims. Claim 1 is now amended to recite testing conditions defining volumetric productivity. As shown in the Declaration, the catalyst in cited reference does not possess the claimed volumetric productivity characteristic. Since

### I. Claims 1, 17, 18, 21, and 23 Are Not Anticipated Or Rendered Obvious by the Wieland Patent Because the Catalyst Described in the Wieland Patent Does Not Possess the Claimed Volumetric Productivity.

Claim 1 recites that "the catalyst possesses a volumetric productivity of at least 10,000 ml H<sub>2</sub> / ml catalyst·hr." Appellant's specification defines "volumetric productivity" at page 3, lines 16-24. The productivity value described in Wieland is provided in terms of liquid hourly space velocity and at conditions that do not

conform with applicant's definition of "volumetric productivity" at page 3, lines 16-24 which includes a specific protocol for measuring "volumetric productivity." As explained in the Declaration (filed December 13, 2004) with attached document "Comparison of MeOH Steam Reforming Catalyst with U.S. Patent 6,413,449" (hereinafter "the 132 Declaration"), calculations show that Wieland's catalyst does not inherently possess the claimed volumetric productivity. The Examiner has not disputed this showing.

The basis for patentability is simple. Appellants have claimed a catalyst that possesses a well-defined, measurable property - namely, "volumetric productivity." Wieland's catalyst does not possess this claimed feature. Therefore, Wieland does not anticipate or render obvious the invention of claim 1.

**IA. "Volumetric Productivity" is a Functional Limitation and Not an "Intended Use"**

Although it is unclear whether it is still an issue, the examiner may erroneously characterize "volumetric productivity" as an intended use. "Volumetric productivity" is not an intended use,

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1 The cases cited by the Examiner, *Otto* and *Casey*, are not relevant to Appellants' claimed invention. In *Otto*, the claim recited:

1. As a new article of manufacture, a core member for hair curlers comprising a body of elastically resilient foam material, the hair being wound directly on said body and said body carrying a hair waving lotion in nonliquid form distributed in the pores of the material.

In *re Otto*, 136 USPQ (CCPA 1963). Thus, in *Otto*, "hair" was not a property of the core member. In *Casey*, the Court found that the functionally claimed feature would inherently occur in the prior art apparatus. See *In re Casey*, 152 USPQ 235, paragraph bridging pages 237-238 (CCPA 1967). In contrast, the presently claimed "volumetric productivity" is an intrinsic property of the catalyst, and it is not an inherent property of the prior art catalyst.

*Swinehart* and *Union Carbide*, cited in this Appeal Brief, are far more relevant to Appellant's claimed catalyst than are the *Otto* and *Casey* cases cited by the Examiner. *Swinehart* involved claims to a composition of matter and *Union Carbide* to a catalyst in a chemical process. To the extent that *Otto* or *Casey* may conflict with *Swinehart*; *Swinehart* is the controlling legal

it is an intrinsic property of the claimed catalyst.

As stated in MPEP § 2173.05(g), "A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context in which it is used." The MPEP cites *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). In *Swinehart*, the claimed invention was distinguished over the prior art, not based on a structural limitation and not based on a compositional limitation, but on a functional limitation (that the material was transparent to infrared). The invention of claim 1, which is distinguished over the prior art based on volumetric productivity (rather than transparency to infrared radiation) is entirely analogous to *In re Swinehart*. See also *Union Carbide Chems. & Plastics Tech. v. Shell Oil Co.*, 308 F.3d 1167, 64 USPQ2d 1545 (Fed. Cir. 2002) in which the Court interpreted a claim to a catalyst "characterizable" by a claimed level of "efficiency %" that is determined by testing at a given set of conditions. In the present case, the "volumetric productivity" is a functional limitation that "must be evaluated and considered, just like any other limitation of the claim."

**IB. Even if One Adopts the Examiner's Reasoning, Claim 1 is Still Patentable Over Wieland.**

In the Official Communication mailed January 25, 2005, the Examiner states: "If the prior art structure is capable of performing the intended use, then it meets the claim." Even if, *arguendo*, one adopts the Examiner's reasoning and characterizes volumetric productivity as an intended use, the claimed invention is still patentable over the Wieland patent because the Wieland catalyst is not capable of performing the claimed volumetric productivity, and thus does not meet the claim.

**II. Catalyst Claims 19, 20 and 26 are Additionally Patentable Over Wieland**

Claims 19 and 20 recited higher levels of volumetric

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authority since *Swinehart* was a subsequent decision of the CCPA.

productivity and are therefore still further patentable over Wieland.

Claim 26 contains an additional limitation of specific activity.

**III. The Invention of Claim 5 is Not Anticipated Or Rendered Obvious by Wieland Because Wieland Does Not Describe Or Suggest a Step of "Depositing Pd" Subsequent to Adding a Base.**

In the Official Communication mailed January 25, 2005, the Examiner states that "The Pd of [Wieland] is considered deposited when the final product is produced by calcining." This is erroneous. As is well-known, calcining involves heating a solid. For example, The Condensed Chemical Dictionary (9th Edition, 1977) defines calcination as "heating a solid to a temperature below its melting point to bring about a state of thermal decomposition or a phase transition other than melting." Clearly, depositing Pd does not occur during a calcining step.

Claims are interpreted from the viewpoint of a person skilled in the art. The inventors (i.e., persons skilled in the art) stated in the 132 Declaration that:

Column 7, lines 13-17 in U.S. Patent No. 6,413,449 describe a part of a process of making a catalyst having the following steps "and is then reduced at constant temperature with an aqueous reducing agent, filtered, washed, dried, calcined in an oxidizing atmosphere at temperatures from 300°C to 550°C, and finally reduced in a hydrogen-containing gas at temperatures from 350°C to 500°C." A worker of ordinary skill in the field of making catalysts would not understand this part of the process as including any step of "depositing Pd." There is no scientific basis to believe that Pd is deposited

during the steps described in this excerpt.

In the example of Wieland, the catalyst powder was filtered and washed before it was dried and calcined. If any Pd remained in solution, it would be removed by filtering and washing, and therefore could not deposit during drying or calcining.

"Redispersing" the catalyst described at col. 7, lines 22-24 refers to creating a suspension of the catalyst, which is followed by coating a support with the dispersed suspension of particles. To the person skilled in the art, this is not a step of depositing Pd. Furthermore, the Examiner has improperly combined unrelated sections of the specification: col. 7, lines 22-24 and col. 7, lines 37-40 are not properly combinable. The "neutralization" of col. 7, lines 37-40 refers to the original dispersion, it is not related to the redispersed suspension of col. 7, lines 22-24.

Therefore, the invention of claim 5 is not anticipated or rendered obvious by Wieland.

**IV. The Invention of Claim 5 is Further Not Anticipated Or Rendered Obvious by Wieland Because Wieland Does Not Describe Or Suggest a Step of Adding a Solution Comprising Dissolved Zinc**

The method of claim 5 is further patentable over Wieland et al., because Wieland et al. do not disclose or suggest a step of adding a solution comprising dissolved zinc to a metal oxide support, nor a step of adding a solid oxide support to a solution comprising dissolved zinc. Claim 5 requires "adding a solution comprising dissolved zinc to the solid metal oxide support, or adding a solid metal oxide support to a solution comprising dissolved zinc." In contrast, Wieland et al. combine a metal oxide with insoluble zinc oxide in an aqueous dispersion. It is true that Wieland et al. state that they subsequently dissolve a portion of

the zinc in the acidic Pd solution; however, this does not constitute a step of "adding" a zinc solution. In other words, Wieland et al. state that they form a zinc solution *in situ*; however, they do not "add" a solution comprising dissolved zinc. Therefore, the rejection of claim 5 should be withdrawn since Wieland et al. do not "add" a solution comprising dissolved zinc, nor a "add" a metal oxide support to a solution comprising dissolved zinc.

#### **V. Method of Making Claims 9, 12, 15 and 33-34 are Additionally Patentable Over Wieland**

Claim 9 recites that the zinc is completely dissolved in solution. In contrast, Wieland et al. do not teach any step of adding zinc that is completely dissolved in solution. Note that at col. 7, lines 33-40, Wieland et al. state that the finely divided zinc oxide powder is partially dissolved by the addition of the acidic noble metal solution. Although the Examiner responded to this argument by referring to Example 1 of Wieland, Example 1 of Wieland lacks any step of adding a base. Therefore, Example 1 cannot anticipate or render obvious the method of claim 5.

Claim 12 recites a step of adding base after the zinc solution is added, while Wieland does not add any zinc solution. Zinc oxide is not dissolved zinc.

Claim 15 recites that the Pd is deposited from a solution of dispersed Pd. The claim has been amended to recite the redundant information that a solution comprises dissolved Pd (as opposed to a suspension in which Pd is attached to solid oxides). The redispersed catalyst of Wieland does not contain dissolved Pd that deposits from solution onto a support.

Claims 33-34 recite that the catalyst is prepared and reduced under hydrogen with temperatures never exceeding 400 °C. Maintaining low temperature increases catalyst life and surface area (see page 4, line 25 – page 5, line 1). All of Wieland's examples substantially exceed this temperature and, although broader ranges are mentioned, Wieland does not recognize the advantage of keeping process temperatures at 400 °C or less. Thus, claims 33-34 are patentable based on this additional ground.

Rejection under 35 U.S.C. § 103 as Unpatentable over Wieland

Claims 8, 17-18, 21, and 31-32 have been rejected under 35 U.S.C. §103(a) as unpatentable over Wieland. This rejection is respectfully traversed.

Claims 8, 17-18, 21 and 31 are patentable for the reasons discussed above.

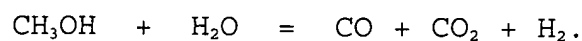
Claim 32 recites that the catalyst is prepared and reduced under hydrogen with temperatures never exceeding 400 °C. Maintaining low temperature increases catalyst life and surface area (see page 4, line 25 – page 5, line 1). All of Wieland's examples substantially exceed this temperature and, although broader ranges are mentioned, Wieland does not recognize the advantage of keeping process temperatures at 400 °C or less. Thus, claim 32 is patentable based on this additional ground.

Rejection under 35 U.S.C. § 103 as Unpatentable over Wieland in view of Feinstein

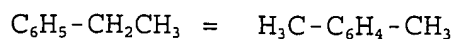
Claims 16 and 22 have been rejected under 35 U.S.C. §103(a) as unpatentable over Wieland further in view of Feinstein et al., U.S. Pat. No. 4,177,219. This rejection is respectfully traversed for reasons A and B set forth below.

**A. The Feinstein Patent is Not Analogous Art.**

Applicant's catalyst and Wieland's catalyst relate to methanol steam reforming:



On the other hand, Feinstein relates to a method for converting (reforming<sup>2</sup>) ethyl aromatics to methyl aromatics (i.e., xylenes), for example:



The standard for analogous art is set forth in MPEP

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<sup>2</sup> The only common feature shared by appellant's claimed invention and the Feinstein patent is the term "reforming." However, the reforming processes are completely different. Martin Luther attempted to reform the Catholic Church, and the juvenile justice system attempts to reform wayward youth – both of these use the term "reforming," but they too are nonanalogous art to methanol steam "reforming."

2141.01(a) ("In order to rely on a reference as a basis for rejection of an applicant's invention, the invention must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.") See also *In re Clay*, 23 USPQ2d 1058 (Fed. Cir. 1992).

The reforming of ethyl aromatics to xylenes is not in the same field as reforming methanol to hydrogen and carbon dioxide. The chemistries are entirely different. As can be seen from the chemical equations above, one process relates to the production of H<sub>2</sub> while the other process relates to the production of xylenes. Thus, Feinstein's process of converting ethyl aromatics to xylenes is not analogous art.

Nor is Feinstein's process "reasonably pertinent to the particular problem with which the inventor was concerned." The problem with which the inventors were concerned was the reaction of methanol with water to produce hydrogen and carbon dioxide. The problem Feinstein was concerned with was the scission of the C-C bond in the ethyl group in ethyl aromatics; this is a completely different problem. Unlike ethyl aromatics, methanol does not have any C-C bonds. Thus, catalyst compositions for the conversion of ethyl aromatics to xylenes are not reasonably pertinent to the problem with which the inventors were concerned.

Therefore, the Feinstein patent is nonanalogous art and it cannot be used in a section 103 rejection.

**B. There is Not a Proper Motivation to Combine the Wieland and Feinstein patents.**

The Examiner is in error in stating that "high scission activity" of Feinstein's catalyst provides a motivation to add Ru into Wieland's catalyst. In Feinstein's process reforming ethyl



aromatics to produce methyl aromatics, the scission of the C-C bond in the ethyl group is critical to forming methyl aromatics. In contrast, methanol does not have any C-C bonds. Therefore, the "high scisson activity" of Feinsein's catalyst is irrelevant to methanol steam reforming.

The situation is similar with regard to conversion and selectivity. Feinsein's catalyst demonstrated good conversion of ethyl aromatics. There are no ethyl aromatics in methanol steam reforming. The selectivity that Feinsein refers to is selectivity to xylenes. In contrast, methanol steam reforming produces no xylenes; with or without Ru, the selectivity to xylenes will be zero in methanol steam reforming. A worker of ordinary skill in the field of methanol steam reforming would know that the catalysts and mechanisms for converting ethyl aromatics to methyl aromatics are not relevant to the catalysts and mechanisms involved in methanol steam reforming (this is stated in the 132 Declaration). Therefore, there is not a proper motivation to combine the teachings of the Wieland and Feinsein references.

Conclusion

If the Examiner has any questions or would like to speak to Applicants' representative, the Examiner is encouraged to call Applicants' attorney at the number provided below.

Respectfully submitted,

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